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CHAPTER 6

Bone mineral density of asylum seekers' children in The Netherlands

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Abstract

Asylum seekers' children in The Netherlands can have seasonal low serum 25hydroxycholecalciferol (s-25(OH)D) levels combined with inadequate dietary calcium intake. In this study we determined in 13 asylum seekers' children (age 6-12 year) with s-25(OH)D levels below 30nmol/L the bone mineral density (BMD) by dual X-ray absorptiometry and related those to the dietary calcium intake. The lumbar spine BMD was below the Dutch and slightly below the U.K. references. The calcium intake was associated with the BMD ($r= 0.59$ $p=0.03$). Our data indicate that low s-25(OH)D levels particular reduce the BMD in asylum seekers' children with inadequate calcium intake.

Key words: Asylum seekers' children, bone mineral density, vitamin D deficiency, dietary calcium intake

Bone continuously undergoes synthesis, remodelling, and resorption. Bone mineralization at the lumbar spine area is hardly influenced by ethnicity of children.¹⁻³ Recently we demonstrated that asylum seekers' children in The Netherlands have low serum 25hydroxycholecalciferol (s-25(OH)D) levels in mid-spring, i.e. after the winter season. Low s-25(OH)D concentrations were frequently combined with low dietary intake of calcium.^{4,5} It has remained unclear however, to what extent these biochemical and nutritional parameters are actually associated with the bone mineralization. In the present study we determined the lumbar spine bone mineralization in asylum seekers' children with low s-25(OH)D levels (below 30nmol/L) by dual X-ray absorptiometry (DEXA-scan, Hologic QDR 4500.⁶ The results were related to the biochemical parameters and to dietary calcium intake.

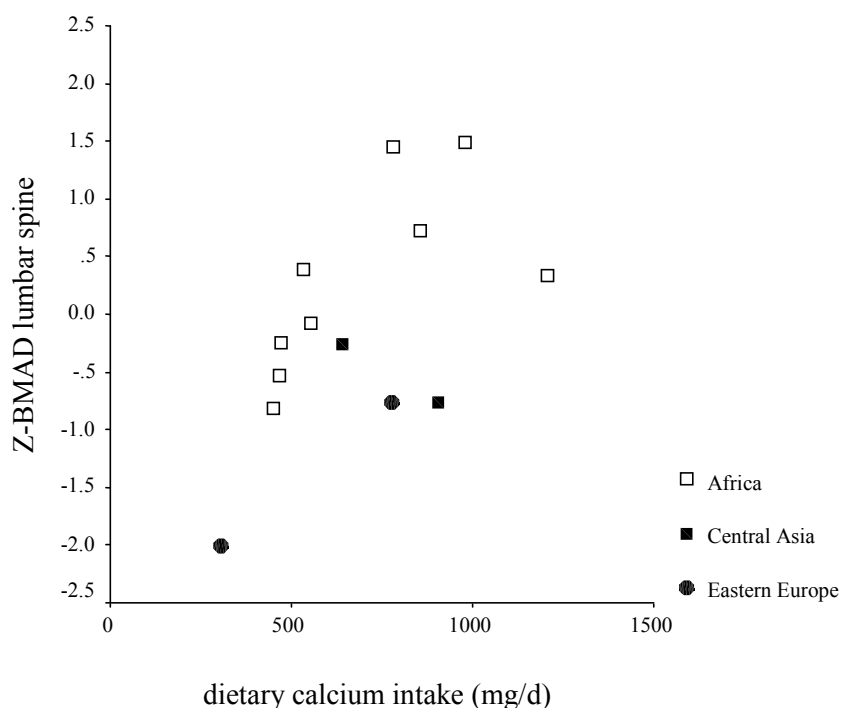
We studied thirteen children, aged 6 to 12 year (median 9.9), who stayed in The Netherlands for 32 months (median, range 16-56). Nine of the 13 children were from African origin. The estimated dietary calcium intake was based on 24 h recall and calculated with the use of a nutritional software package (Unilever B.V., Vlaardingen, The Netherlands).

Analysis using the Mølgaard model, indicated that six children had 'small bones' (Z-scores height for age between -2.2 and -1.1) or 'narrow bones' (Z-score bone area for height between -2.43 and -1.46) and four other children had 'under-mineralized,' bones (Z-score bone mineral content for area between -3.24 and -1.20).⁷ The lumbar spine bone mineral density (LSBMD; g/cm²) was below the Dutch age and gender specific Z-scores (Median -1.84, range -2.99 and -0.47) and the lumbar spine bone mineral apparent density (LSBMAD; g/cm³) was slightly below the UK references (median Z-score -0.19, range -2.02; +1.49).^{8,9} The bone mineral density did not correlate with the biochemical parameters of the vitamin D status, except for a negative relation between Z-LSBMAD and serum phosphate ($r=-0.58$ $p=0.02$).

The estimated dietary calcium intake that varied between 300 and 1300 mg, did neither correlate with the s-25(OH)D levels ($r=0.34$, $p=0.25$) nor with African origin ($r=-0.04$, $p=0.89$). The dietary calcium intake however was positive related to the Z-LSBMAD (g/cm³) ($r=0.59$, $p=0.03$; Figure 1). Our data indicate that the low vitamin D levels particularly reduce the bone mineralization in asylum seekers' children with inadequate calcium intake. The preventable character underlines the importance of adequate nutritional education with respect to vitamin D and calcium intake for asylum seekers' children in The Netherlands.

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Figure 1 Relationship between dietary calcium intake and Bone Mineral Density in vitamin D-deficient asylum seekers' children in The Netherlands.



Relationship between dietary calcium intake and the age and gender specific Z-scores of the lumbar spine Bone Mineral apparent Density measured by DEXA-scan in vitamin D-deficient asylum seekers' children in The Netherlands.

Vitamin D deficiency was defined as a s-25OHcholecalciferol <30nmol/L

Lumbar spine bone mineral apparent density (g/cm³) measured by DEXA-scan, Hologic QDR 4500 and Z-score calculated of the U.K. reference.

The linear correlation between dietary calcium intake and Z-LSBMAD could be characterised by the following equation: $[Z-LSBMAD] = 0.0017x [\text{dietary calcium intake}] - 2.20$. (Spearman correlation coefficient $r = 0.59$; $p=0.03$).

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